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Abstract Title: Identifying Organic Molecules in Space - The AstroBiology Explorer (ABE) MIDEX Mission Concept

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Abstract:

Infrared spectroscopy in the 2.5-16 micron range is a principle means by which organic compounds can be detected and identified in space via their vibrational transitions. Ground-based, airborne, and spaceborne IR spectral studies have already demonstrated that a significant fraction of the carbon in the interstellar medium (ISM) resides in the form of complex organic molecular species. Unfortunately, neither the distribution of these materials nor their genetic and evolutionary relationships with each other or their environments are well understood. The Astrobiology Explorer (ABE) is a MIDEX mission concept currently under study at NASA's Ames Research Center in collaboration with Ball Aerospace and Technologies Corporation. ABE will conduct IR spectroscopic observations to address outstanding important problems in astrobiology, astrochemistry, and astrophysics. The core observational program would make fundamental scientific progress in understanding (1) the evolution of ices and organic matter in dense molecular clouds and young forming stellar systems, (2) the chemical evolution of organic molecules in the ISM as they transition from AGB outflows to planetary nebulae to the general diffuse ISM to HII regions and dense clouds, (3) the distribution of organics in the diffuse ISM, (4) the nature of organics in the Solar System (in comets, asteroids, satellites), and (5) the nature and distribution of organics in local galaxies. The technical considerations of achieving these science objectives in a MIDEX-sized mission will be presented.

Key Words: Astrobiology, Astrochemistry, Infrared, Spectroscopy, Organic Molecules, Interstellar Medium